Academy of Drafting and Design
Honors & Regular Geometry
Construction Estimating
Unit Plan

Academy Name: Academy of Drafting and Design **School: Seabreeze High School**

Integrated Unit Plan Title: Construction Estimating
Courses to integrate: Drafting and Design I and Regular & Honors Geometry
Grade Level: 9 & 10
Timeline & Duration: 2 weeks
Essential Question: Does the student demonstrate the ability to identify and apply geometry concepts related to architectural design and recognize the various applications and end results due to materials required and differences in the geometric design.

Unit Summary : Understanding the basics of Geometry and its application to the real world in construction estimating.

Overview of Activities/Lessons per Course				
Course	Drafting & Design I	Drafting & Design 1	HONORS GEOMETRY	HONORS GEOMETRY Prentice Hall
	ACTIVITY	LESSON	ACTIVITY	LESSON
Activity/Lesson	Floor Plan Drawing	architectural CAD commands	Residential roof project	10-1 Area of parallelograms and triangles
Activity/Lesson	Floor plan	CAD blocks	Residential landscape project	10-2 Areas of trapezoids, rhombuses, and kites

Activity/Lesson	Floor plan	architectural dimensioning	Residential landscape project	10-3 Areas of regular polygons
Activity/Lesson	Roof costs		Residential Survey project	10-4 Perimeters and areas of similar figures
Activity/Lesson			Residential roof project	10-5 Trigonometry and area

Lesson Instructions for Geometry Honors:

Standards (Performance Tasks/Course Frameworks/Sunshine State Standards): M.A 912.G.2.5, M.A.912.G.2.7, MA912.G.4.4, MA.912.T.2.1
Rigor & Relevance (quadrant): C

Instructions to Teacher:

1. Teacher provides a list of essential terms.
2. Teacher provides examples that demonstrate the concept .
3. Teacher will have students engaged in identifying the terms as they relate to real world application. Example engineering, architectural drawings and google maps
4. The students will be divided into small groups of 4-5 students. The students will work with pre-developed drawings that deal with a residential home. Students will apply area formulas to the drawings and be asked to calculate and determine basic construction costs as related to each project.

Instructions to Students:

1. Read sections related to the geometry concepts covered
2. Complete work assigned and turn it on time
3. Identify the terms as they relate to real world application, while participating in class discussions and group projects

Instructions for Student Accommodations:
Follow all IEP and 504 Plan requirements.

Assessment for Activity:
Test/Quiz/Project

Approximate Length of Time for Activity: 7- 50 minute periods
Materials Needed: Text: Geometry Computer Software program: AutoCAD, Power Point Paper, graphing paper, pencil, straight edge, ruler
Resources Needed: AutoCAD program, Power Point Presentation
Attachments: LESSON PLANS 10-1 THRU10-5

Lesson Instructions for Drafting and Design I:

Standards (Performance Tasks/Course Frameworks/ Sunshine State Standards): **Rigor & Relevance (quadrant): D**
Instructions to Teacher: The students will be working with a partner drawing an architectural floor plan with symbols and dimensions. The floor plan is 1200 square feet and is drawn using CAD software. The students will draw the floor plan and then calculate the roof costs for the home using a variety of possible materials and geometric designs. The students will create a matrix showing the differences in their calculated costs for each possibility.
Instructions to Students: 1. The average cost for residential construction in this area is $120.00 per square foot. The cost for the roof of your house may vary according to the material specified and the slope of the roof (a steeper roof requires more labor cost to install). 2. Make a table which shows the following data: Shake shingles, Spanish tile, asphalt shingles/15 years, asphalt shingles/25 years; with different slope combinations of 3/12, 6/12, 9/12 and 12/12. See attachment. 3. Shake shingles are sold in bales containing 100 pieces. Each piece is 12" long by 6" wide. Each piece overlaps the one below it about halfway. The price per bundle is $72 and the labor cost is $45 per bale regardless of roof slope. 4. Spanish tile is sold in pallets (because of the weight). each pallet holds enough tile to cover 100 square feet of roof and costs $120. Labor cost is $120 per pallet for up to a 4/12 slope and double for steeper slopes. Asphalt shingles are sold by the bundle and a bundle covers 33-1/3 square feet. Labor cost is $45 per square (a square is defined as 100 square feet) for a 3/12 slope. A 20% premium is added to the labor each time the slope increases by a factor of 3

up to 160% for 12/12. A bundle of 15 year asphalt shingles costs $22. A bundle of 25 year asphalt shingles costs $40 and requires a $10 per square premium on the labor.

5. Complete a table using the above data which shows the average cost of the slopes; larger slopes require more shingles.

Instructions for Student Accommodations:
Follow all IEP and 504 requirements for individual students.

Assessment for Activity:
Students will be assessed as follows: On the finished scaled drawings

Approximate Length of Time for Activity: 10 - 50 minute periods

Materials Needed:
-Software program: AutoCAD
-computers
-paper:

Resources Needed: AutoCAD Software, Plotter

Attachments:

SAMPLE TABLE

SLOPE	SHAKE SHINGLES	SPANISH TILE	ASPHALT/ 15 YR	ASPHALT/ 25 YR
3/12	7.80	6.00	7.40	7.00
6/12	7.80	9.00	8.00	7.36
9/12	7.80	9.00	8.60	7.72
12/12	7.80	9.00	9.20	8.08

Academy of Drafting and Design
Honors & Regular Geometry
Integrated Unit Plan

Academy Name: Academy of Drafting and Design **School: Seabreeze High School**

Integrated Unit Plan Title: Patterns and Inductive Reasoning
Courses to integrate: Drafting and Design I and Regular & Honors Geometry
Grade Level: 9 & 10
Timeline & Duration: 2 weeks
Essential Question: Does the student demonstrate the ability to identify and apply geometry concepts related to architectural design and recognize various characteristics of architecture used in the world today.

Unit Summary : Understanding the basics of Geometry and its application to the real world

Overview of Activities/Lessons per Course				
Course	Drafting & Design I	Drafting & Design 1	HONORS GEOMETRY Ford Pas	HONORS GEOMETRY Prentice Hall
	ACTIVITY	LESSON	ACTIVITY	LESSON
Activity/Lesson	Single view drawings		Course 4 Module 11 Activity1	LESSON 1 PATTERNS AND INDUCTIVE REASONING
Activity/Lesson	Single view drawings		Course 4 Module 11 Activity1	POINTS, LINES AND PLANES

Activity/Lesson	Single with dimensions		Course 4 Module 11 Activity1	SEGMENTS AND THEIR MEASURES
Activity/Lesson	FPM 11.1	Multi-views, Isometric	Course 4 Module 11 Activity1	ANGLES AND THEIR MEASURES
Activity/Lesson	FPM 11.1	Multi-views, Isometric	Course 4 Module 11 Activity1	SEGMENT AND ANGLE BISECTORS
Activity/Lesson	FPM 11.1	Multi-views, Isometric	Course 4 Module 11 Activity1	ANGLE PAIR RELATIONSHIPS
Activity/Lesson	FPM 11.1	Multi-views, Isometric	Course 4 Module 11 Activity1	INTRODUCTION TO PERIMETER, CIRCUMFERENCE AND AREA

Lesson Instructions for Geometry Honors:

Standards (Performance Tasks/Course Frameworks/Sunshine State Standards): M.A 912. G.1.1, M.A 912. G.1.2 **Rigor & Relevance (quadrant): C**
Instructions to Teacher: 1. Teacher provides a list of essential terms. 2. Teacher provides examples that demonstrate the concept . 3. Teacher will have students engaged in identifying the terms as they relate to real world application. Example engineering and architectural drawings
Instructions to Students: 1. Read sections related to the geometry concepts covered 2. Complete work assigned and turn it on time 3. Identify the terms as they relate to real world application, while participating in class discussions
Instructions for Student Accommodations: Follow all IEP and 504 Plan requirements.

Assessment for Activity: Test/Quiz
Approximate Length of Time for Activity: 7- 50 minute periods
Materials Needed: Text: Geometry Computer Software program: AutoCAD, Power Point Paper, graphing paper, pencil, straight edge, ruler
Resources Needed: AutoCAD program, Power Point Presentation
Attachments: LESSON PLANS 1-1 THRU1-7

Lesson Instructions for Drafting and Design I:

Standards (Performance Tasks/Course Frameworks/ Sunshine State Standards): 16.05, 16.07, 17.04, 20.03, 21.03 **Rigor & Relevance (quadrant): D**
Instructions to Teacher: The students will be divided into small groups of 4-5 students that have been assigned in Geometry Class. The students will redesign an athletic equipment product and draw the required multi-views and one isometric view to communicate the improvements that have been incorporated.
Instructions to Students: 1. Begin by discussing the redesign of an athletic product and producing a working sketch within the group. 2. Each student in the small group will draw a scaled view, using CAD, of the redesigned product. 3. Copy and paste the multi-views views onto one sheet. 4. Plot the drawing to the correct scale.
Instructions for Student Accommodations: Follow all IEP and 504 requirements for individual students.
Assessment for Activity: Students will be assessed as follows: On the finished scaled drawings

Approximate Length of Time for Activity: Four - 50 minute periods
Materials Needed: -Software program: AutoCAD -computers -paper:
Resources Needed: AutoCAD Software, Plotter
Attachments:

Academy of Drafting and Design
Honors & Regular Geometry
Folding Carton Unit

Academy Name: Academy of Drafting and Design **School: Seabreeze High School**

Integrated Unit Plan Title: Patterns and Nets
Courses to integrate: Drafting and Design I and Honors Geometry
Grade Level: 9 & 10
Timeline & Duration: 7 days Geometry, 7 days Drafting
Essential Question: Does the student demonstrate the ability to identify and apply geometry concepts related to the architectural design of cartons.

Unit Summary : Design and create a folding carton using geometric patterns and nets.

Overview of Activities/Lessons per Course				
Course	Drafting & Design I	Drafting & Design 1 Hands-On AutoCAD	HONORS GEOMETRY	HONORS GEOMETRY Prentice Hall
	ACTIVITY	LESSON	ACTIVITY	LESSON
Activity/Lesson	Pattern making practice	Manipulating CAD objects	Drawing Nets and creating a pattern	Nets and Drawings for Visualizing Geometry 1-1
Activity/Lesson	Folding carton drawing		Analyzing a designed carton	Points Lines and Planes 1-2
Activity/Lesson	Isometric drawing	Pictorial	Analyzing a	Measuring Segments

		representations	designed carton	1-3
Activity/Lesson			Analyzing a designed carton	Space Figures and Cross sections 11-1
Activity/Lesson			Analyzing a designed carton	Surface Areas of Prisms and Cylinder 11-2
Activity/Lesson			Drawing Nets and creating a pattern	Surface Areas of Pyramids and Cones 11-3

Lesson Instructions for Geometry Honors:

Standards (Performance Tasks/Course Frameworks/Sunshine State Standards): M.A 912. G.7.1, M.A 912. G.8.1, MA.912.G.1.1, MA.912.G.7.2, MA.912.G.7.3, MA.912.G.7.5, MA.912.G.7.7, **Rigor & Relevance (quadrant): C**
Instructions to Teacher: 1. Teacher provides a list of essential terms. 2. Teacher provides examples that demonstrate the concept . 3. Teacher will have students engaged in analyzing a designed carton through measuring, drawing and labeling. Students will apply concepts such as surface area and Euler's formula to aide in the analysis process.
Instructions to Students: 1. Read sections related to the geometry concepts covered 2. Complete work assigned and turn it on time 3. Identify the terms as they relate to real world application, while participating in class discussions
Instructions for Student Accommodations: Follow all IEP and 504 Plan requirements.
Assessment for Activity: Test/Quiz/project
Approximate Length of Time for Activity: 7- 50 minute periods

Materials Needed: Text: Geometry Computer Software program: AutoCAD, Power Point Paper, graphing paper, pencil, straight edge, ruler
Resources Needed: AutoCAD program, Power Point Presentation, cartons
Attachments: Geometry Lessons 1-1,1-2,1-3,11-1, 11-2, and 11-3

Lesson Instructions for Drafting and Design I:

Standards (Performance Tasks/Course Frameworks/ Sunshine State Standards): 07.02, 07.03, 09.02, 09.03, 16.06, 16.09,18.03 **Rigor & Relevance (quadrant): D**
Instructions to Teacher: The students will work with a partner to design and draw a folding carton
Instructions to Students: 1. Begin by discussing the shape and size of a specific folding carton of your choice 2. The students will design and draw a scaled pattern of a folding carton using CAD. The design must show glue flaps. 3. Plot two copies the carton pattern on index paper. 4. Assemble one plotted carton by folding and gluing and demonstrate to the class how the second plotted carton folds together. (Students may color or place designs on their carton sides if they wish.) 5. Students will draw an isometric view of their folding carton and plot the scaled drawing.
Instructions for Student Accommodations: Follow all IEP and 504 requirements for individual students.
Assessment for Activity: Students will be assessed as follows: On the finished scaled folding carton drawings
Approximate Length of Time for Activity: Four - 50 minute periods
Materials Needed:

-Software program: AutoCAD -computers -paper:
Resources Needed: AutoCAD Software, Plotter
Attachments: